Polycystic Ovarian Syndrome Among the Medical Students of Tertiary Care Hospital of Eastern India - A Cross-sectional Study

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ABSTRACT

Objective: To evaluate the prevalence of Polycystic ovarian syndrome (PCOS) and the risk factor profile among medical students.

Methods: This was a cross-sectional study carried out among the 117 MBBS students of IMS & SUM Hospital, Bhubaneswar staying at the institutional hostel. Pre-existing hypothyroid was present in 8 students and were excluded from the study. They belonged to the age group of 17 to 25. Data was collected regarding risk factors of PCOS from 109 students by adopting a self-designed questionnaire method. PCOS was diagnosed in the study population as per AE-PCOS (2006) society.

Results: In our study prevalence of PCOS was 9.17%. The mean age of the population was 20.68±2.06. The average age of menarche was 12.86±1.58. The mean BMI of the population was 21.89±4.54. On chi-square analysis of different risk factors of PCOS, overweight and obesity, W/H ratio had a significant association with PCOS with p values of 0.00 and 0.00 respectively.

Conclusions: A simple questionnaire-based study can be used as an efficient and cost-effective tool for the screening of PCOS and identification of risk factors present in a target population.

Key Words: PCOS, Hyperandrogenism, Ovulatory Dysfunction, Obesity. Lifestyle, Basal Metabolic Index

INTRODUCTION

Polycystic ovarian syndrome (PCOS) is one of the common endocrine system disorders found in reproductive age women of all races and ethnicities¹⁻³ but it is not a specific endocrine disorder having a unique cause. Rather it is a complex disorder wherein numerous genetic variants and environmental factors interact, combine and contribute to the pathophysiology. Polycystic ovaries and the clinical features PCOS reflect a functional derangement in follicular development, resulting in chronic anovulation. The prevalence of PCOS features in unspecified populations reported an incidence rate of 3–10%.^{4,5} Mostly sex hormone imbalance is a characteristic feature of PCOS¹.

Common symptoms included are irregular menstrual cycle, polycystic ovaries and hirsutism². Oligomenorrhea is the most common presentation in women with PCOS. Cosmetically disturbing hirsutism is complained by nearly 70% of anovulatory women. The severity of hirsutism depends upon is related primarily to the level of hyperandrogenemia and genetic sensitivity of the individual's hair follicle to androgens.

Evidence of familial clustering seen in PCOS suggests a genetic mode of inheritance. Several studies have been conducted to find out the possible candidate genes responsible for susceptibility to PCOS but none of the studies found the role of any single gene in the development of PCOS.

In the diagnosis of PCOS, three different sets of diagnostic criteria are used mostly.

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- 1) Androgen Excess Society and PCOS Society (AE-PCOS) in 2006.^{6,7}
- 2) 'European Society of Human Reproduction & Embryology' and 'the American Society for Reproductive Medicine (ESHRE/ASRM) in 2003 (referred to because of the Rotterdam criteria).⁷
- 3) National Institutes of Health (NIH)'s Criteria led at an international conference on PCOS in 1990 which was Diagnostic criteria for the polycystic ovarian syndrome.⁸⁻¹⁰

Each set of criteria has slightly different clinical, biological, and image-based findings to work out the presence or absence of PCOS. It is one of the most debated topics in the field of endocrinology due to its constantly evolving diagnostic criteria, making it difficult to determine the prevalence of PCOS with consistency (Table A).

The major clinical features of the polycystic ovarian syndrome are hyperandrogenism and menstrual dysfunction. The important point is that PCOS is a functional disorder in which polycystic ovaries result from chronic anovulation. Although present in most women with chronic hyperandrogenic anovulation, polycystic ovaries do not establish and are not required for the diagnosis of PCOS.¹¹

So we devised a questionnaire method based on history and clinical examination to assess the risk factors of PCOS present in the population and diagnose PCOS stressing the fact that ultrasonography is not an absolute investigation modality to diagnose PCOS.

PCOS is a functional disorder in which polycystic ovaries result from chronic anovulation so polycystic ovaries do not establish and are not required for the diagnosis of PCOS.

OBJECTIVES

- 1) To evaluate the prevalence of Polycystic ovarian syndrome (PCOS) and the risk factor profile of PCOS among the medical students by adopting a self-designed questionnaire method.
- 2) To target the population with risk factors of PCOS and educate them at an early stage to prevent the development of this syndrome and early detection and prompt treatment to prevent the onset of late sequelae.

MATERIALS AND METHODS

This was a cross-sectional study carried out among the 117 MBBS students of IMS & SUM Hospital, Bhubaneswar who stayed in a hostel. Permission to conduct the study was obtained from IEC vide letter no.180346. They belonged to the age group between 17 to 25yrs. Data was collected regarding risk factors of PCOS through a self-designed questionnaire method from 109 students. PCOS was diagnosed in

the study population as per AE-PCOS (2006) society (Table A) which uses features of hyperandrogenism and ovulatory dysfunction to diagnose PCOS. Ovulatory dysfunction was diagnosed by cycle length of <21 days or > 35days. Hyperandrogenism was assessed by the population as self-reported unwanted hair growth and persistent acne. Pre-existing hypothyroid was present in 8 students and were excluded from the study. Relevant history, risk factors, and clinical features were noted and analyzed.

STATISTICAL ANALYSIS

Data collected was entered into the SPSS software system for analysis. Statistical tests used to analyze data were percentage and Chi-square tests. A p-value <0.05 on the chi-square test was considered statistically significant.

RESULTS

The prevalence of PCOS in our study was 9.17%. As shown in Table -1, 57.79% of the population fall into the normal BMI range whereas 20.18% were overweight and 4.58% were obese. 17.43% were underweight. The activity was described in modes of attending gymnasium, doing Yoga, and involvement in different kinds of sports. On basis of this, it was seen that 81.66% of students were having an active lifestyle. 16.51% included junk food in their diet on a regular basis. 25.68% had a W/H ratio > 0.88. A family history of PCOS was present in 33.02%. Ovulatory dysfunction either in terms of oligomenorrhea and polymenorrhea was present in 58.70% of the population. The menstrual pattern was scanty in 12.84% of students and heavy in 14.67% of students. 35.77% did not have any pain during menstruation. Hyperandrogenism identified clinically was present in 47.70% of the population. Psychological changes described in terms of mood changes and irritability was present in 44.98% of cases.

In this study, as depicted in table 2, the mean age of the population was 20.68±2.06. The average age of menarche was 12.86±1.58. The mean BMI of the population was 21.89±4.54.

Table 3 revealed chi-square analysis of risk factors of PCOS. P-value < 0.05 was considered clinically significant. On chi-square analysis of different risk factors of PCOS overweight and obesity, W/H ratio had a significant association with PCOS with a p value of 0.00 and 0.00 respectively. Other risk factors like junk food, sedentary lifestyle, F/H of DM 2 were not found to be significantly associated with the development of PCOS.

DISCUSSION

As a syndrome, PCOS is a collection of signs and symptoms and no single test is therefore diagnostic. Stein Leventhal originally described the syndrome as a reproductive disorder characterized by enlarged sclerotic ovaries, menstrual disturbances, obesity, infertility, and hirsutism.

AES recommends that PCOS should be considered as a disorder of androgen excess and that NIH diagnostic criteria should be used. It also recommends that polycystic ovaries need not be present to make a diagnosis of PCOS and conversely their prevalence alone doesn't establish the diagnosis.

A questionnaire is a research instrument consisting of a series of questions to gather information from respondents. This is an efficient and cost-effective tool for collecting more data in less period in the target population. So it was considered to be an ideal strategy for screening of PCOS in the target population and implement early intervention and prompt treatment to prevent late sequelae of a syndrome like the development of DM type-2, cardiovascular diseases, endometrial carcinoma, breast carcinoma, etc.

The prevalence of PCOS worldwide is highly variable. It may range from 2.2% to 33%^{12,13}. The prevalence of PCOS in young women (17-25 years) using the AE-PCOS (2006) criteria in our study was 9.17% and in the study done by Nidhi et al., the prevalence rate was 9.13%¹⁴. Though different criteria were used for the diagnosis of PCOS, the prevalence was similar in both studies. The mean age of the population in our study was 20.68 ± 2.06 . In a study by Singh et al., most of the respondents (78.58 %) were in their late adolescence.¹⁵ A similar study on PCOS shows it to be more common in late adolescence (76.2 %).¹⁶ In our study Ovulatory dysfunction either in terms of oligomenorrhea and polymenorrhea was present in 58.70% of the population and hyperandrogenism identified clinically was present in 47.70% of the population. In a study by Singh et al., oligomenorrhea was seen in 85% of the PCOS cases, hirsutism in 19%, and acne in 41%.¹⁵ Some reports suggest that features of menstrual irregularity in the early phase of menarche are early signs of PCOS¹⁷ and about 50% of the adolescents having oligomenorrhoea have chances of developing PCOS as adults.

The modifiable risk factors evaluated are intake of junk food, activity level. Family history of PCOS in 1st generation relatives and H/O DM type 2 are non-modifiable risk factors.

Family H/O PCOS was present in 33.02% of the study population with a 'P' value of 0.92 which was not statistically significant. But Singh et al. observed that about 43% had a positive family history of PCOS in first-generation relatives.

Kausar-Miller et al. also found a correlation with the genetic predisposition for PCOS in their study^{15,18}.

Overweight and obesity were present in 24.77% and W/H ratio >0.8 in 25.68% of the population. In our study, the 'P' value of the risk factors came as 0.00 & 0.00 which were statistically significant to consider an association between overweight, obesity & W/H >0.8 with PCOS. In a study conducted by Joseph N et al., the confirmed cases of PCOS had significantly higher BMI. BMI was significantly higher in students confirmed with PCOS in another study¹⁹⁻²¹. Joshi B et al., in their study, found, among those diagnosed with PCOS, 71.8% were nonobese, 7.5% cases were overweight, and 20.7% were observed²². The strong association between obesity, hyperandrogenism, menstrual abnormalities emphasizes the importance of addressing lifestyle issues in women with PCOS focusing on nutrition and exercise. A significant improvement in metabolic and reproductive function can be brought upon even by a small reduction in weight (2-5%).

The other objective of our study was to target the population with risk factors of PCOS and educating them at an early stage to prevent the development of this syndrome and early detection to prevent late sequelae.

The activity was described in modes of attending gymnasium, doing Yoga, and involvement in different kinds of sports. On basis of this, it was seen that 81.66% of students were having an active lifestyle. Junk food intake, a sedentary lifestyle was present in 16.5% and 18.34% of students with 'P' values 0.54 & 0.68 respectively which was not statistically significant. Though several pieces of literature mentioned the association of Junk food, sedentary lifestyle, and family history of DM 2 with PCOS, we did not find any significant association of PCOS with the above risk factors. A larger sample size could have yielded an association of the above risk factors with PCOS.

CONCLUSION

- 1) Prevalence of PCOS in our study was 9.17%. Of all risk factors, a significant association was found with overweight, obesity, and W/H ratio >0.8 . PCOS cases had higher waist to hip ratios and higher BMI.
- 2) In a large population where performing ultrasonography for all is cumbersome and logistically difficult to diagnose PCOS and assess the risk factors, an appropriately designed questionnaire method can be used to diagnose PCOS in less period.
- 3) Diagnosing the cases early could aid in early intervention by spreading awareness about risk factors responsible for the development of PCOS.

It could also aid in prompt treatment of PCOS thereby preventing late sequelae of the syndrome.

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Conflict of interest:

The authors declare no conflict of interest.

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PS and SPM: Concept and design, Final approval of the version to be published **MMD:** Manuscript drafting, **HB:** Data collection, **GS:** Final editing and revision

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Table A:

National Institutes of Health (NIH) 1990 [10]	Rotterdam 2003 [7]	AE-PCOS Society 2006 [6]	NIH 2012/International PCOS Guidelines 2018 [8,9]
<ul style="list-style-type: none"> Hyperandrogenism Chronic Anovulation ✓ Both criteria needed 	<ul style="list-style-type: none"> Hyperandrogenism Oligo-and/or anovulation Polycystic ovaries ✓ 2 of 3 criteria needed 	<ul style="list-style-type: none"> Hyperandrogenism Ovarian dysfunction ✓ Both criteria needed 	<ul style="list-style-type: none"> Hyperandrogenism Oligo-and/or anovulation Polycystic ovaries ✓ 2 of 3 criteria needed
First developed and most commonly used criteria today	Formulated to expand on NIH diagnostic definition	Formulated to provide an evidence-based definition	Encouraged a name change(2012 only) and identifying sub-phenotypes

Table 1: Population characteristics

VARIABLES		CASES	PERCENTAGE
BMI	<18.5	19	17.43
	18.6-24.9	63	57.79
	25-29.9	22	20.18
	>30	05	04.58
ACTIVITY	Active	89	81.66
	Sedentary	20	18.34
DIETARY HABIT	Veg	38	34.86
	Mixed	53	48.62
	Junk	18	16.51
W/H RATIO	>0.88	28	25.68
	<0.88	81	75.31
F/H PCOS	Y	36	33.02
	N	73	66.97
CYCLE LENGTH	Oligomenorrhoea	37	33.94
	Polymenorrhoea	27	24.77
MENSTRUAL FLOW PATTERN	Scanty	14	12.84
	Normal	79	72.47
	Heavy	16	14.67
DYSMENORRHOEA	Y	70	64.22
	N	39	35.77
HYPERANDROGENISM	Y	52	47.70
	N	57	52.29
PSYCHOLOGICAL DYSFUNCTION	Y	49	44.95
	N	60	55.04

Table 2: Socio-demographic factors

Variables	Mean ± SD
Age	20.68±2.06
Menarche	12.86±1.58
Weight	55.67±10.42
Height	158.73±5.69
BMI	21.89±4.54

Table 3: Chi-square analysis of risk factors of PCOS

Risk factors	N	%	p-value
Overweight&Obesity	27	24.77	0.00
Junk food	18	16.51	0.54
Sedentary life style	20	18.34	0.68
F/H PCOS	36	33.02	0.92
W/H ratio (>0.8)	28	25.68	0.00